Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in this application.

Listing of Claims:

1. (Currently Amended) A receiving system for connection to an antenna arrangement for detecting response signals from a substance having quadrupolar nuclei excited so as to produce nuclear quadrupole resonance therein, the system comprising:-

an amplifier to amplify the received response signal for subsequent processing; and

a matching section to match the amplifier to the antenna;

wherein the matching ~~section:~~ section includes a noise matching circuit to closely noise match ~~matches~~ the receiving system to the antenna ~~during~~ for an entire duration of a receiving period; and has a low impedance to reduce the Q factor of the antenna without significantly degrading the signal to noise ratio.

2. (Original) A receiving system as claimed in claim 1, wherein the matching section presents an effective lower impedance to the antenna.

3. (Previously Presented) A receiving system as claimed in claim 1, wherein said matching section comprises a damping means to damp stored transmitter energy from the antenna, without effecting further switching or configuration changes.

4. (Previously Presented) A receiving system as claimed in claim 1, including isolating means to selectively isolate the antenna from the receiving system; the isolating means including

switching means to isolate the receiving system from the antenna during a transmitting period when an excitation signal is transmitted by the antenna to irradiate the substance, and to electrically connect the receiving system to the antenna during the receiving period immediately after the transmitting period.

5. (Original) A receiving system as claimed in claim 4, wherein the isolating means is interposed between the antenna and the matching section to block the high voltage that may be generated on the antenna during the transmitting period.

6. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means includes ¼ wave lines terminated with back to back diodes to provide isolation, in combination with nodes being set close to the amplifier by protection diodes.

7. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means operates through a pi-network that is equivalent to a ¼ wave line in operation, terminated with back-to-back diodes.

8. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means operates on a change of inductance from a high value to a low value of impedance during the switching process, the low value of the isolating means having impedance that is less than the characteristic input impedance of the matching section.

9. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means is auto-switching, triggered by monitoring electronically an increase or decrease in input signal level beyond a threshold level.

10. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means is auto-switching, triggered by a second input that monitors electronically an increase or decrease in signal from the transmitter unit output.

11. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means is triggered by a reproducible electrical signal which is synchronised to the transmit sequence.

12. (Previously Presented) A receiving system as claimed claim 4, wherein the switching means has opening and closing characteristics shaped in time.

13. (Previously Presented) A receiving system as claimed in claim 4, wherein the switching means is not frequency dependent over the general range of NQR lines of interest.

14. (Previously Presented) A receiving system as claimed in claim 4, wherein said isolation means is followed by a low impedance signal receive circuit that reduces energy in the antenna and remains in the low impedance state during the entire receiving period.

15. (Previously Presented) A receiving system as claimed in claim 1, wherein said matching section is constructed from high figure-of-merit transistors to create a close to ambient temperature thermal noise match to the antenna.

16. (Previously Presented) A receiving system as claimed in claim 1, wherein an additional low impedance, low voltage high-speed semiconductor switch is included after said isolation means to function as a damping switch.

17. (Previously Presented) A receiving system as claimed in claim 16, wherein said damping switch has predetermined transition rates so as not to re-excite the antennae through parasitic capacitance or changes in state.

18. (Previously Presented) A receiving system as claimed in claim 16, wherein the damping switch is transistor based and is included at the input of the matching section to controllably lower the input resistance to signal ground, the damping switch being driven by a pulse synchronised to the transmit sequence.

19. (Previously Presented) A receiving system as claimed in claim 16, wherein the damping switch is based on a FET or parallel FETs pulse triggering the gate or gates.

20. (Previously Presented) A receiving system as claimed in claim 16, wherein the damping switch is based on a MOSFET or parallel MOSFETs where the source and drain are connected from the signal input to ground, and that a pulse to the gate triggers the damping switch.

21. (Previously Presented) A receiving system as claimed in claim 16, wherein the turning on and off characteristics of the damping switch are controlled through time.

22. (Previously Presented) A receiving system as claimed in claim 1, wherein the matching section comprises transistors that are JFETs arranged in parallel source and drain connections with their gates at signal ground.

23. (Previously Presented) A receiving system as claimed in claim 1, wherein the matching section comprises a plurality of JFET transistors arranged in a cascode arrangement with a negative feedback circuit.

24. (Original) A receiving system as claimed in claim 23, bipolar transistors are provided at the source connection of the JFETs.

25. (Previously Presented) A receiving system as claimed in claim 23, wherein the negative feedback circuit is equivalent to a cold resistor.

26. (Previously Presented) A receiving system as claimed in claim 23, wherein the negative feedback circuit is a capacitor or inductor combination.

27. (Previously Presented) A receiving system as claimed in claim 23, wherein the negative feedback circuit is resistive with most of the fed-back current being conveyed away from the signal input to signal ground through a capacitive or inductive divider.

28. (Previously Presented) A receiving system as claimed in claim 1, wherein the bandwidth of the matching section is limited in gain by a tuned circuit.

29. (Original) A receiving system as claimed in claim 28, wherein the chosen bandwidth would typically lie in a range from 1kHz to 200kHz.

30. (Previously Presented) A receiving system as claimed in claim 1, wherein the amplifier is of negative feedback with a low noise figure.

31. (Original) A receiving system as claimed in claim 30, wherein the voltage is fed-back through a negative feedback circuit that is equivalent to a cooled resistor.

32. (Original) A receiving system as claimed in claim 31, wherein the feedback circuit is resistive with most of the fed-back current being diverted away from the signal input through a capacitive or inductive divider.

33. (Previously Presented) A receiving system as claimed in claim 1, wherein a selected number of low forward voltage diodes, arranged back-to-back, are included at the input to signal ground of the matching section.

34. (Original) A receiving system as claimed in claim 33, wherein the diodes are of Schottky and/or Germanium type.

35. (Previously Presented) A receiving system as claimed in claim 33, wherein the diodes are DC biased to lower their cut-off voltage range.

36. (Previously Presented) A receiving system as claimed in claim 1, including an antenna arrangement having more than one output, the voltage at each output having approximately the same magnitude.

37. (Original) A receiving system as claimed in claim 36, wherein the signal from each output passes through separate receive channels that are identical.

38. (Original) A receiving system as claimed in claim 36, wherein the signal from each output passes through separate receive channels that are not identical.

39. (Previously Presented) A receiving system as claimed in claim 36, wherein the receiving antenna includes a coil with two ends, where the signal from each end is approximately equal in magnitude but opposite in polarity relative to a signal ground point located in between the two ends.

40. (Previously Presented) A receiving system as claimed in claim 4, wherein the isolating means has two differential inputs and two balanced outputs with respect to ground, and the matching section has two differential inputs and a single output relative to ground.

41. (Previously Presented) A receiving system as claimed in claim 36, wherein the isolating means has two differential inputs and two balanced outputs with respect to ground, the matching section has two differential inputs and two outputs, and the amplifier has two differential inputs and a single output.

42. (Previously Presented) A receiving system as claimed in claim 36, wherein a further damping switch is included from the signal ground to the output of the antenna, the damping switch being triggered by a synchronized pulse to the transmit signal pulse sequence.

43. (Previously Presented) A receiving system as claimed in claim l, wherein the matching section is cooled to obtain improved thermal and shot noise performance.

44. (Currently Amended) A method for receiving a response signal via an antenna arrangement from a substance having quadrupolar nuclei excited so as to produce nuclear quadrupole resonance in certain of the quadrupolar nuclei, comprising: noise matching an amplifier to the antenna and lowering the Q factor of the antenna system during an entire

duration of a receiving period when the response signal may be received by the antenna arrangement, before processing the received signal further.

45. (Original) A method as claimed in claim 44, wherein the noise matching is achieved by presenting an effective lower impedance to the antenna.

46. (Previously Presented) A method as claimed in claim 44, including damping stored transmitter energy from the antenna, without effecting further switching or configuration changes.

47. (Original) A method as claimed in claim 46, wherein said damping includes rapidly removing energy from the antenna at the start of the receiving period.

48. (Previously Presented) A method as claimed in claim 44, including improving the phase stability of the response signal during the receiving period.

49. (Currently Amended) A method as claimed in ~~in~~ claim 44, including isolating the antenna arrangement during a transmitting period when an excitation signal is transmitted by the antenna to irradiate the substance, and electrically connecting the antenna arrangement to enable thermal noise matching during the receiving period.

50. (Previously Presented) A method as claimed in claim 49, wherein the isolating includes blocking the high voltage that may be generated on the antenna during the transmitting period.

51. (Previously Presented) A method as claimed in claim 49, wherein the isolating operates on changing the inductance of the from a high value to a low value of impedance during the switching process, the low value having impedance that is less than the characteristic input impedance of the matching.

52. (Currently Amended) A method as claimed in ~~in~~ claim 44, including the cycle of maintaining a high Q on the antenna during the transmitting period, followed immediately by a low Q during the entire receiving period for any data gathering transmit signal pulse sequence in the field irradiating the substance.

53. (Currently Amended) A system for connection to an antenna ~~arran ement~~ arrangement for receiving and detecting response signals from a substance having quadrupolar nuclei excited so as to produce nuclear ~~guadrupole~~ quadrupole resonance therein, the system comprising:-

means for amplifying the received response signal for subsequent processing;

means for noise matching the amplifier to the antenna during an entire duration of a receiving period, and

means for reducing the Q factor of the antenna during the receiving period without significantly degrading the signal to noise ratio.

54. (Previously Presented) A receiving system as claimed in claim 1, wherein said noise matching circuit has the lowest noise figure close to the source resistance of the antenna arrangement.